

Amendments to the Specification:

Please replace the paragraph on page 1, lines 1-3, with the following amended paragraph:

The present invention relates to weatherable styrenics with improved translucency. More particularly, the invention relates to ~~modify~~ modified acrylate-styrene-acrylonitrile (ASA) plastics with improved translucency for better colorability.

Please replace the paragraph on page 3, lines 1-8, with the following amended paragraph:

There is a particular need for weatherable ASA plastics which allow matching of bright colors at reduced pigment cost or production of bright intense colors with better depth of color with reduced pigment usage while maintaining other desirable properties. Weatherable ASA materials with improved translucency that reduces opacity, resulting in better colorability can be prepared from SAN ~~copolymer~~ copolymer grafted alkyl acrylate rubber, preferably butyl acrylate rubber, with a matrix rigid phase prepared from polymethyl methacrylate (PMMA) and methyl methacrylate-styrene-acrylonitrile (MMASAN) terpolymer.

Please insert the following new paragraph to begin on page 3, line 9. Kindly note that this is not a "replacement paragraph".

In one embodiment the present invention generally provides for an acrylate-styrene-acrylonitrile type (ASA) composition comprising:

- a) a matrix phase comprising (i) a terpolymer of a vinyl carboxylic acid ester monomer, a vinyl aromatic monomer and a vinyl cyanide monomer and (ii) a polymethylmethacrylate (PMMA); and
- b) a graft copolymer comprising (i) a substrate rubber and (ii) a superstrate copolymer, wherein the substrate rubber comprises a rubber derived from a vinyl carboxylic acid ester monomer and wherein the superstrate copolymer comprises a copolymer derived from both a vinyl aromatic monomer and a vinyl cyanide monomer,

wherein the matrix phase is present at a weight percent level of from about 75 to about 25 weight percent of the total weight of the composition; and

wherein the graft copolymer is present at a level of from about 25 to about 75 weight percent of the total weight of the composition. and the substrate rubber is

present at a level of from about 5 to about 55 weight percent of the total weight of the composition.

Please replace the paragraph currently beginning on page 3, line 9 through page 4, line 9, with the following amended paragraph:

The In another embodiment the present invention generally provides for an acrylate-styrene-acrylonitrile type (ASA) composition comprising:

- a) a continuous phase or matrix, frequently denoted a "rigid matrix phase," comprising a mixture of:
 - 1) MMASAN, a terpolymer of methyl methacrylate and styrene acrylonitrile ranging in weight percent composition of the continuous rigid phase of from about 90 weight percent to about 10 weight percent; and
 - 2) PMMA, a homopolymer of methylmethacrylate, polymethylmethacrylate, ranging in weight percent composition of the continuous phase of from about 10 weight percent to about 90 weight percent; and
- b) a discontinuous phase, dispersed in the continuous phase, comprising:
 - 1) a core graft rubber where the core is butyl acrylate rubber comprising from about 15 to about 90 weight percent of the total core graft disperse phase and
 - 2) a graft or superstrate polymer of styrene acrylonitrile (SAN) comprising from about 85 to about 10 weight percent of the total core graft disperse phase;

wherein the continuous or matrix phase comprises from about 90 to about 10 weight percent of the total composition; and

wherein the dispersed or discontinuous phase comprises from about 10 to about 90 weight percent of the total composition.

Please replace the paragraph on page 4, lines 15-19, with the following amended paragraph:

As used herein, the terms "weatherable" and "weatherability" ~~refers~~ refer to the ability or property of a material to effectively withstand the conditions of an outdoor environment over a long period of time (years) with substantially no degradation or decomposition, that is, resistance to UV radiation and to exposure to cyclic variations in temperature and humidity.

Please replace the paragraph on page 10, lines 20-24, with the following amended paragraph:

In ~~one embodiment~~ various embodiments, the feed streams to the reactor vessel and the reaction mixture ~~contains~~ contain from about 0.01 to 4 pbw. ~~In a second embodiment, they are~~ or from about 0.1 to 1.5 pbw, polyethylenically unsaturated monomer per 100 pbw monoethylenically unsaturated alkyl acrylate (vinyl carboxylic acid ester) monomer.

Please replace the paragraph beginning on page 10, line 25 through page 11, line 6, with the following amended paragraph:

In ~~one embodiment~~ various embodiments of the present invention, the monoethylenically unsaturated alkyl acrylate monomer utilized in the emulsion is selected to provide a poly(alkyl acrylate) rubber having a glass transition temperature (T_g) of less than or equal to 25°C . ~~In another embodiment, or~~ or less than or equal to 0°C . ~~In yet a third embodiment, or~~ or less than or equal to -30°C . As referred to herein, the T_g of a polymer is the T_g value of polymer as measured by differential scanning calorimetry (heating rate $20^{\circ}\text{C}/\text{minute}$, with the T_g value being determined at the inflection point).

Please replace the paragraph beginning on page 11, line 21 through page 12, line 4, with the following amended paragraph:

The surfactant is for example one or more compounds according to formula $\text{R-SO}_3\text{M}$ ~~and~~ or $\text{R-SO}_4\text{M}$ wherein R is alkyl ~~or alkoxy~~, and M is a hydrogen radical or a cation. In a preferred embodiment, R is $(\text{C}_1\text{-C}_{30})\text{alkyl}$ ~~or $(\text{C}_1\text{-C}_{30})\text{alkoxy}$~~ , more preferably $(\text{C}_6\text{-C}_{30})\text{alkyl}$ ~~or $(\text{C}_6\text{-C}_{30})\text{alkoxy}$~~ , and M is a metal cation, an ammonium cation, an alkyl ammonium cation or an alkoxy ammonium cation. Suitable metal cations include, for example, sodium, potassium, lithium and magnesium cations. Suitable alkyl ammonium cations include, for example, diethyl ammonium and tetraethyl ammonium cations. Suitable alkoxy ammonium cations, include, for example, diethanol ammonium and tetraethanol ammonium cations.

Please replace the paragraph on page 12, lines 19-26, with the following amended paragraph:

As non-ionic surfactants there may also be used ethylene oxide/propylene oxide copolymers containing a percentage by weight of ethylene oxide ~~comprised~~ comprising between 30 and 95%. Examples of non-ionic ethylene oxide addition products surfactants include the addition products of nonylphenol with 9, 20, 40 and 100 moles of ethylene oxide, the addition product of ~~oleie~~ oleyl alcohol with 55 moles of ethylene oxide and the addition product of 1,4-sorbitan stearate with 20 moles of ethylene oxide, and particularly the adducts of nonylphenol with more than 20 moles of ethylene oxide.

Please replace the paragraph on page 13, lines 1-12, with the following amended paragraph:

The one or more initiators used in the preparation of the acrylate rubber are preferably selected from a conventional free radical initiators such as, for example, an organic peroxide compound, such as, for example, benzoyl peroxide, a persulfate compound, such as, e.g., potassium persulfate, an azonitrile compound such as, for example, 2,2'-azobis-2,3,3-trimethylbutyronitrile, or a redox initiator system, such as, for example, a combination of a peroxide or hydroperoxide, such as for example, hydrogen peroxide, cumene hydroperoxide or t-butyl hydroperoxide, an oxidizing agent, such as for example, ferrous sulfate, a chelating agent such as, for example, tetrasodium pyrophosphate, ethylene diamine tetraacetic acid or a salt of ethylene diamine tetraacetic acid, and a reducing agent, such as for example, sodium formaldehyde sulfoxylate or a reducing sugar.

Please replace the paragraph on page 13, lines 13-23, with the following amended paragraph:

In one embodiment, the redox initiator system comprises a combination of cumene hydroperoxide, ferrous sulfate, a chelating agent, preferably, the disodium salt of ethylene diamine tetraacetic acid and sodium formaldehyde sulfoxylate as the polymerization initiator. In a second embodiment, the redox initiator system contains from 0.05 to 0.5 pbw cumene hydroperoxide per 100 pbw of the vinyl carboxylic acid ester monoethylenically unsaturated alkyl methacrylate monomer, an amount of sodium formaldehyde sulfoxylate effective to ~~provided~~ provide a sodium formaldehyde sulfoxylate:cumene hydroperoxide molar ratio of about 0.9:1 to 1:1.1, from 0.1 to 10 pbw of the disodium salt of ethylene diamine tetraacetic acid per 100 pbw cumene hydroperoxide and from 0.1 to 10 pbw ferrous sulfate per 100 pbw cumene hydroperoxide.

Please replace the paragraph on page 15, lines 1-14, with the following amended paragraph:

As is well known in the art, PMMA may be produced by the polymerization of methyl methacrylate monomer to form a homopolymer. PMMA homopolymer exists in its pure form only theoretically and is generally available commercially as a mixture of the homopolymer and with one or more copolymers of methyl methacrylate with C₁-C₄ alkyl acrylates, such as ethyl acrylate. Such commercially available PMMA copolymers ~~containing~~ contain methyl methacrylate and from about 1 percent to about 30 percent by weight of one or more C₁-C₄ alkyl acrylates. Such PMMA homopolymers are suitable for use in the present invention as the vinyl carboxylic acid ester monomer component. Copolymers of PMMA with minor amounts of one or more copolymerizable monomers are also intended to be encompassed, e.g., the copolymer of

methyl methacrylate with styrene and/or acrylonitrile. The molecular weight of the polymethylmethacrylate polymer can range from 50,000 to 450,000, preferably from about 100,000 to about 250,000 as a weight average molecular weight.

Please replace the paragraph on page 15, lines 15-18, with the following amended paragraph:

In ~~one embodiment~~ various embodiments, the ASA polymers comprises about 10 percent to about 40 percent of ~~poly (butyl acrylate) rubber~~. In a second embodiment, or about 15 percent to about 30 percent. ~~In yet a third embodiment, or~~ or about 15 percent and to about 25 percent of poly (butyl acrylate) rubber.

Please replace the paragraph on page 15, lines 19-24, with the following amended paragraph:

In one embodiment, the rubber graft phase comprises ~~of~~ from about 20% poly(butyl acrylate) to about 70% poly(butyl acrylate). In another embodiment, the rubber graft phase comprises about 45% poly (butyl acrylate) rubber and 55% SAN, with the SAN portion of the graft phase made from styrene and acrylonitrile in amounts in a range of 65% styrene and 35% acrylonitrile to 75% styrene and 25% acrylonitrile. In yet another embodiment, the SAN portion of the graft phase comprising comprises about 70-75% styrene and about 25-30% acrylonitrile.

Please replace the paragraph beginning on page 15, line 25 through page 16, line 7, with the following amended paragraph:

It will be appreciated that, in general, the particle size of the rubber in the emulsion during the graft polymerization reactions has an effect upon the optimum grafting level for the graft copolymer. A given weight percentage of smaller size rubber particles will provide considerably greater surface area for grafting ~~then~~ than the equivalent weight of a larger size rubber particle. Accordingly, the density of grafting will be varied depending upon the size of the rubber particle. Generally, the smaller rubber particles will tolerate a higher superstrate/substrate ratio than larger size particles to give generally comparable results.

Please replace the paragraph on page 16, lines 8-14, with the following amended paragraph:

In one embodiment, the MMASAN comprises ~~of preferred~~ 80% MMA, 15% ~~Styrene~~ styrene and 5% ~~Acrylonitrile~~ acrylonitrile. In another embodiment, the MMASAN comprises about 60% MMA, 30% ~~Styrene~~ styrene and 10% ~~Acrylonitrile~~ acrylonitrile. In a third embodiment, the MMASAN comprises about 45% methyl methacrylate, 40% styrene and 15% acrylonitrile. In one embodiment, the

PMMA/MMASAN ratio in the matrix phase copolymer ranges from about 20/80 to about 80/20; and in another embodiment, from 25/75 to about 75/25 including 50/50.

Please replace the paragraph on page 16, lines 15-20, with the following amended paragraph:

The ASA polymer in one embodiment comprises of ratios of graft phase to matrix phase of 15/85 to 75/25, and in another embodiment, about 45% graft phase and 55% matrix phase. The graft copolymer phase may be coagulated, blended and collided with the matrix phase homopolymers, copolymers and/or terpolymers by the various blending processes which are well known in the art to form the ASA polymer blend.

Please replace the paragraph beginning on page 16, line 21 through page 17, line 10, with the following amended paragraph. Kindly note only 3 parentheses and one comma have been amended.

Pigments suitable for use in the present invention include, by way of example, furnace black, inorganic pigments including aluminates such as cobalt aluminate blues, ceramic pigments such as the manganese violets, chromates such as chrome yellow and orange (lead chromates, optionally with lead sulfate), zinc yellow (zinc chromate), molybdate orange (lead chromate and sulfide and lead molybdate), chrome greens (greenish chrome yellow pigments with iron blues), iron blues (based on ferric ammonium ferrocyanide), oxides such as iron oxide (from yellow to black, particularly the browns or buffs and reds), chromium oxide greens (anhydrous), sulfides or cadmiums such as cadmium sulfide (orange or yellow with zinc sulfide), cadmium sulfoselenide (reds and oranges), cadmium mercury (mercadmiums), cadmium-lithium compounds and lithopones (barium sulfate extended versions of cadmium sulfide and cadmium sulfoselenide), titanates such as nickel titanate, (a yellow colorant), titanium dioxides (whites including the rutiles and the anatase pigments), zinc sulfide white, ultramarine blues (aluminosilicate complex containing sulfur) and cobalt blue (a mixture of ultramarine blue and zinc oxides).

Please replace the paragraph on page 17, lines 11-19, with the following amended paragraph:

Suitable organic dyes and pigments include, for example, quinophthalone, isodolines, perylenes for yellows, ~~diketo-pyrrole-pyrrole~~ diketo-pyrrolo-pyrrole, a cadmium-type red, high temperature versions of organic pigments such as azoic reds and yellows including azo compounds and acid azo pigments, quinacridones, phthalocyanine blues or greens, anthraquinone dyes, scarlet 3b Lake, chromophthalocyanine ~~pyrroles~~ pyrroles, halogenated phthalocyanines, quinolines, heterocyclic dyes, perinone dyes, anthracenedione dyes, thioxanthene dyes, ~~parazolone~~ pyrazolone dyes, polymethine pigments, blends of organic and inorganic mixed metal oxide pigments and others.

Please replace the paragraph on page 18, lines 18-26, with the following amended paragraph:

EXAMPLES 1-5. Blends of polymethyl methacrylate (PMMA) with methyl methacrylate-styrene-acrylonitrile terpolymer were used as matrix for SAN grafted poly(butyl acrylate) dispersed rubbery graft phase. The examples illustrate the use of three appropriate ASA/PMMA/MMASAN compositions in parts by weight and advantages of the present invention as compared to ASA/PMMA and ASA/MMASAN formulations. The compositions ~~of the~~ were subjected to measurement of opacity values and found to have an opacity of less than 91 percent at 1/8 inch thickness. Opacity as herein defined is measured on a 25D Hunter Colorimeter and expressed as a percent.

Please replace the Abstract on page 25, lines 1-6, with the following amended Abstract:

Rubber modified weatherable styrenic blends with improved transparency and colorability are disclosed. A matrix phase of poly(alkyl alkylacrylate) and vinyl carboxylic acid ester-vinyl aromatic-vinyl cyanide terpolymer is combined with a rubbery graft phase of a poly(alkyl acrylate) rubber substrate grafted with a vinyl aromatic-vinyl cyanide superstrate copolymer to provide acrylate-styrene-acrylonitrile type (ASA) compositions.